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beneficial experience; no harder to cultivate bodily infirmity, or logical inconsequence, or mental imbecility, or moral obliquity, than to make the best of our faculties and opportunities.

The naturalist must also ask whether the contented enjoyment of normal life may not afford better evidence of intention than fickle lack of stability.

Those who are satisfied with the sort of natural theology which finds its type in filial affection, based upon gratitude rather than expectations, may possibly find evidence for this sort of teleology in nature, without first settling the disputes of the philosophers about the relation between mind and matter.

The most obvious answer to reasoning like Ward's is that we fail to find in nature any reason why all life, or, for that matter, all nature, may not come to an end this instant; for the assertion that the stability of nature is necessary to our welfare means nothing more than that this stability is much desired by those who have found life worth living.

If we are sure only of the present and of the past, and if science gives us nothing more than reasonable expectations about the future, which may or may not prove well founded, it is evident that we must look to the present and to the past for evidence of purpose in nature if we are to find it in nature at all.

They who are dissatisfied with this sort of purpose, and tell us it weighs upon them like a nightmare, must remember that there is no reason to doubt and good reason—as good reason as our own existence—to expect that the future will, on the whole, be essentially like the past; and that while the so-called predictions of science are no more than reasonable expectations they are reasonable expectations, since they are part of our nature as reasonable beings, as we have come about in accordance with the mechanical principle of natural selection.

If I am sure that natural knowledge has been useful and profitable and delightful to me I am as utterly unable to see why the discovery of a mechanical equivalent for truth should affect this conviction as I am to see how the scientific study of the mechanism of digestion can destroy my conviction that food and drink have, on the whole, been good for me: as unable as I

am to see here proof that I do nothing which one who had exhaustive knowledge of any organic mechanism might have expected one to do, would prove that I am not reasonable and responsible. It is true that I have suffered because of my food, but I have never suffered from natural knowledge, and better knowledge of the mechanism of digestion might have helped me to avoid this suffering.

So far as I understand the scientific frame of mind, and may be permitted to speak for the naturalist, he is neither a materialist nor an idealist nor an agnostic monist, although the 'possible experience' of the idealist seems to him to afford ample room for a physical universe as material as the most ardent materialist could desire. It also seems to him that if common folks are to refrain from a search for purpose in nature until the philosophers have settled all their little questions and have reached an agreement among themselves they had better abandon all hope of finding the meaning of nature.

Each new philosopher assures us that his only motive is to help us to reach the truth and to set our minds at rest, but it may be that while philosophers fall out the simple-minded men of science may come by their own and live at ease.

W. K. BROOKS.

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The Races of Europe. WILLIAM Z. RIPLEY. New York, D. Appleton & Co. 1899. Pp. xxxii+624. Accompanied by a Supplementary Bibliography of the Anthropology and Ethnology of Europe, published by the Public Library of the City of Boston. Pp. x+160.

The interesting series of articles on the physical anthropology of Europe which Professor Ripley contributes to *Appletons' Popular Science Monthly* has been published in a revised form under the above title, accompanied by a very full bibliography of the subject. The work is based on a study of the very extensive published and much unpublished material that has been collected in various parts of Europe, and is an attempt at coordinating the results obtained by European investigators. The labor and the difficulties involved in a task of this kind are formidable, and the author deserves the thanks of all students for having made

easily accessible a vast amount of scattered literature. He has set forth, with great clearness and in a most fascinating form, certain results obtained by detailed statistical inquiries of great magnitude. The graphical coordination has been made with admirable skill, which will appeal to every one who knows the difficulty involved in combining material collected according to different methods and under different conditions. For this reason the useful and highly instructive maps of a large portion of Europe, and even of the whole globe, must be taken for what they are intended—as graphic representations of the known features of various human types so far as known at the present time, but without any claim to absolute accuracy, which in the present state of our knowledge would be impossible. The material comprised in these maps enables the author to present concisely and clearly a number of the most important problems of European somatology.

The primary object of Professor Ripley's studies is the explanation of the present distribution of human types in Europe. Four factors determine the same: heredity, environment, chance variation and selection.

It is a difficult task to ascribe to each of these its proper sphere of influence in the development of the human types inhabiting a continent whose people have undergone so many changes of location as those of Europe. Professor Ripley agrees with most authors in recognizing three fundamental types in Europe: the long-headed, dark Mediterranean; the short-headed, brunet Alpine; and the long-headed, blond Teutonic type. The author rightly dwells on the fact that, on the whole, human types are comparatively stable in given areas, and for this reason prefers to give to the types geographical names (p. 128). He suggests that it would have been desirable to designate the type of northwestern Europe also by a geographical term—such as Deniker's 'Nordic'—rather than by a national term, such as 'Teutonic,' which he uses throughout. The prevalent types of various regions he explains largely as due to mixtures of these fundamental types, and as modifications due to environment, chance variation and selection.

The multiplicity of these causes and our lack

of knowledge of the mode of their action make all conclusions based on them very doubtful. The causes may be combined in various manners to explain a given phenomenon. The lower stature of mountaineers is explained by less favorable economic conditions, while the still less favorable influence of the highest region is said to be counterbalanced by its selective influence, which eliminates the less vigorous elements of the population. When the obscure effects of social or geographical environment are insufficient to explain existing conditions, heredity as expressed by mixture, and selection or chance variation, enter as convenient factors which enable us to find a plausible explanation. The ease with which the extremely complex phenomena can be explained by various combinations of these causes seems to me a reason of weakness of the conclusions set forth by Professor Ripley. Our ignorance of the conditions which influence modification of inherited form suggest that before accepting a given theory we should seek for historical corroboration of the same. This has been given in a few cases, as in the discussion of the types of Brittany (p. 101); but sufficient historical and archæological evidence is not available or has not been given to raise many conclusions beyond serious doubt. It would seem that combinations of causes such as are brought forward to explain the conditions in Burgundy (p. 144) are so uncertain that they cannot be considered more than a very risky hypothesis. The uncertainty of this method is also well illustrated in the discussion of the characteristics of the types of the Alps. The author is led to explain in many places the permanence of the Alpine types by the remoteness and unattractiveness of Alpine valleys, while in others the high variability of the Alpine population is explained by the assumption that the valleys contain the 'ethnological sweepings of the plains' (p. 106). Historical evidence is just as much necessary in the study of physical types as it is in that of geographical names, which are very liable to lead to erroneous results, unless studied in their oldest accessible forms. Only when our knowledge of the causes influencing human types is much more definite than it is now may we hope to reconstruct the de-

tails of their history without the corroboration of historical evidence. Many of the explanations contained in the book are certainly plausible, and add very much to its attractiveness; but I should be inclined to emphasize the elements of uncertainty much more than the author does.

On the whole, Professor Ripley considers economic attractiveness as one of the principal causes that regulate the distribution of types. According to his theory the fertile plains were always subject to foreign invasion, while the less fertile hills contain the most ancient types. While in historic times, when population had reached a considerable density, this cause must have been very effective, we may doubt if it acted in the same manner in very early times, when the continent was sparsely settled, when agriculture was not the only means of subsistence and when dense forests and swamps, difficult of access, or steppes that are now fertile occupied plains. The author calls attention to the fact that the invasion of the Alpine type cannot be explained in this manner.

I feel least in accord with Professor Ripley's ready resort to mixture as an explanation of peculiarities of type. This view is closely connected with the interpretation of what constitutes a type or a race. I do not think the term 'Races of Europe' a fortunate one, but, with Gerland and Ehrenreich, I am inclined to reserve the term for the largest divisions of mankind. The differences between the three European types are certainly not equal in value to the differences between Europeans, Africans and Mongols; but they are subordinate to these. The term 'type' appears most appropriate for the sub-divisions of each race.

It would seem that if the author had given us in his work not only an analysis of what differentiates the various types of Europe, but also a description of what is common to them—a subject that would seem eminently proper in a discussion of European man—his views might have been somewhat modified. The important anatomical characteristics of the race as a whole have found no place in his work; in the chapter on European origins (pp. 457 ff), in which he deals with the general question of race, only the anthropometric evidence and

pigmentation are treated. Considering the most generalized form of the European race as it reveals itself in the child, we should be inclined to consider it a highly specialized form of the Mongoloïd, type from which it departs principally by the peculiar development of the nose and adjoining parts of the face and by a general decrease of pigmentation. On account of the high degree of variability; of the originally small distribution of this type, and of the apparent tendency of hybrids with other races to revert to the other parental race rather than to the European Race, I should be inclined to consider the European one of the latest human types. In early times this race was probably slightly specialized in a number of areas, each area exhibiting a considerable degree of variability. The loss of pigmentation, and change in facial form, were not equally pronounced everywhere, so that one region would be darker colored or broader faced than another, although not by any means uniform in itself. For this reason the occurrence of blondes or of narrow-faced and elongated heads in an otherwise dark, broad-faced and short-haired region does not necessarily prove mixture. At present we have no means of telling how stable these types had become before the extensive mixture which certainly has taken place throughout Europe. For this reason it seems a vain endeavor to seek for individuals representing the 'pure type,' even if there had been no mixture. In his discussion of the 'Three European Races' (Chap. VI.) Professor Ripley acknowledges the variability without, however, discovering that it makes conclusions as to mixture exceedingly doubtful, except in very pronounced cases.

It does not seem to me justifiable to consider all the individuals that are short-headed and brunette, although living in an area which, on the average, is long-headed and blonde, as belonging to the Alpine type, and to explain their presence as due to mixture between the two types. They may simply represent the remoter variations from the long-headed blonde type. This question has a most important bearing upon the explanation of facts of social selection (pp. 537 ff) by the assumption of different tendencies in the two types.

The problem can hardly be solved satisfac-

torily until we have acquired a much better knowledge than we now possess of the variabilities of the various types and of the degrees of correlation between the various features that characterize each type. This information is not yet available. No method has yet been devised for measuring the variability of pigmentation. The military selection, which vitiates so many anthropometric results, unfortunately often obscures the actual variability entirely. Thus all curves of stature in Livi's great work on Italy are asymmetrical on account of the elimination of all individuals below 155 cm. and the decreasing frequency of rejection correlated with increasing stature. This selection increases all the averages, and lessens the variabilities the more, the shorter the average of the type. Neither is it quite safe to take the irregularities of curves of distribution as evidence of mixture, unless they are subjected to a very careful analysis.

The author considers as the most valuable anthropometric characteristic the form of the head as expressed by the cephalic index, and depreciates the value of facial proportions and of absolute measurements. We cannot quite agree with this view. The cephalic index is often a most valuable means of distinguishing the types composing a race, but not by any means the only one. Our selection of characteristic measurements must always be guided by existing differences, whatever these may be. Two types may have the same cephalic index and still differ in the general form of the skull and of the face to such a degree as to require separate treatment. Neither must we disregard the absolute values of the diameters of the head. The great length of the negro cranium as compared to its small capacity has a meaning quite different from the same length of the European cranium of large capacity. For this reason we cannot accept the daring map of the distribution of the cephalic index the world over (p. 42) as signifying any racial relationships. Cephalic index alone cannot be considered a primary principle of classification.

Neither are cephalic index and pigmentation alone a sufficiently broad basis for the characterization of racial types. The consideration of these two features leads the author to designate

the European Race as intermediate between the African and Asiatic Races, without considering the great objections to this theory which are found in the form of the face, the size and form of the brain, the proportions of the extremities. Neither do we feel it safe to explain the fine, wavy hair of the European as due to a mixture between the frizzly African and the straight Asiatic hair.

We most heartily concur with the author's emphatic demand for treating physical, ethnographical, and linguistic methods separately. The misconception of what constitutes a racial type, a cultural group, and a linguistic stock has caused a vast amount of futile speculation. The three methods may be used, each in its particular domain, for reconstructing part of the history of mankind, and each may be used, to a limited extent, as a check on the two others. When two tribes of people speak closely related languages the inference may be drawn that they are in part related in blood, although the strain of common blood may be so slight as to escape anthropometrical methods entirely. Cultural similarity is no proof of blood relationship, since culture may be easily disseminated among tribes of different descent.

We cannot undertake, in this brief review, to discuss in detail the data and theories regarding the history and distribution of types in various parts of Europe. The book contains no tabular statements that would enable the reader to check any of them. It is the intention of the author that the student should verify his statements by the help of the very full bibliography which accompanies the volume. The 'Supplementary Bibliography of the Anthropology and Ethnology of Europe' is very complete in everything pertaining to anthropometry and to the study of pigmentation. The fact that Professor Ripley had to deal entirely with European literature is the cause that he uses the two terms Anthropology and Ethnology as meaning Somatology and Racial Classification, while their American use is quite different, Anthropology denoting the science of man in general, and Ethnology dealing with the activities of man. The supplementary titles bearing upon linguistics and archæology are not intended to be exhaustive, but merely refer to the subjects

treated in the text. The titles are conveniently arranged, and, on the whole, accurate, although the proof-reader might have been more consistent in spelling and more careful in reading the titles of foreign publications. The entire omission in the discussion of anatomical characteristics peculiar to the race as a whole and of the characteristics of the inner organs is, of course, repeated in the Bibliography.

The omission of all detailed and tabular matter have helped to give the book an attractive and popular form, but it has made it impossible to substantiate adequately any of the theories which the author advocates. It is to be feared that this method may mislead the general reader to believe that physical anthropology has accomplished much more than it actually has done, and that it may tend to perpetuate opinions which are likely to be materially altered by further inquiries.

FRANZ BOAS.

QUARRY INDUSTRY AND QUARRY GEOLOGY.

UNDER this title comes to us from the pen of Dr. O. Herrman, teacher in the Technological Institute at Chemnitz, Saxony, and from the press of Borntraeger Brothers, Berlin, an interesting volume of 428 pages on 'technical geology with practical hints for the commercial use of stone,' having special reference to the quarry industries of the Kingdom of Saxony. The briefest glance over its pages gives rise to the wish that we had as thorough a work on the building stones of our own country, for, in addition to its fullness of information, it possesses that rare quality of careful arrangement which is so seldom found in books. The work opens with a bibliography of the field covered, a list of institutions where building materials may be tested, with a brief tabulation of the modes of testing and a list of the geologic museums and larger study collection of rocks in Saxony.

The scientific discussion opens with a description of the rock-making minerals and their distribution; then follows a careful discussion of the rocks, their texture, composition and geographic distribution; next is discussed the physical and chemical properties of the minerals and rocks and the bearing of these upon the utility of the latter, and finally are consid-

ered certain geologic phenomena and their relation to the utilization of stone. Space is then given to the discussion of the most important uses of the more common stones worked in quarries. A chapter on modes of quarrying follows in proper order, concluding with a description of the methods for dressing the quarried stone.

The second section of the book, which is full of geologic and technical detail, is devoted to a discussion of the rocks of the Kingdom of Saxony.

The work closes with an appendix in which are discussed Saxon materials for road building and pavements, statistics of the quarry industries and a very useful tabular statement of the scientific and commercial characters of the different kinds of rock available for constructive purposes.

This work in its systematic arrangement is to the technological student what the classic works of Rosenbusch are to the petrographer. It must be conceded that we owe much to Germany for original research on the structure and classification of rocks and also for careful and accurate discussion of the facts determined. In our own country, unfortunately, at the present time, the knowledge of the architect and engineer on the subject of building stones is somewhat empirical and while accurate, since it is based on actual experience, is not fully collated and recorded in any one book to which one may turn for exhaustive information. It is to be earnestly hoped that the example of Dr. Herrman's publication will influence some one of our many competent authorities to group together and classify for publication all that is known about the building stones of North America.

F. J. H. M.

THE DEPOPULATION OF FRANCE.

THERE are interesting and important books on various subjects and there are also various books on interesting and important subjects. To the latter class belongs *Natalité et Démocratie*, written by M. Dumont and published at Paris by MM. Schleicher. The statistics are so badly arranged that it is difficult to find definite information, while the discussion does not carry much weight. But the problem is of extreme